REMARKS/ARGUMENTS

The Examiner objected to the drawings for failing to include, in Figs. 1A and 1D, reference numerals mentioned in the specification. Rather than amending the drawings, applicants have amended the specification at page 5, lines 3 and 6 to include designation to these reference numerals. In addition the Examiner objected to the drawings for failing to display reference numeral 20 (cited at page 18, line 12) and reference numerals 456 and 469 (cited at page 24, lines 4 and 20). In response thereto applicants are submitting herewith a corrected Fig. 3 wherein reference numerals 20 and 393 have be added and a corrected Fig. 4 wherein reference numerals 456 and 469 have been added and the lines to which reference numerals 458 and 466 apply have been corrected, as recited in the specification at page 24, lines 4, 9, 19, and 20. Withdrawal of the objection to the drawings is therefore respectfully requested.

The specification is also being amended in the paragraph starting page 9, line 7 to improve its form and more clearly to point out a prime advantage of applicants' invention.

Claims 1-5 and 17 were rejected, 35 USC 112, second paragraph, as being indefinite. Claims 1 to 5 are being cancelled, and claim 17 has been amended, at both prior lines 4 and 6, to recite "said serving base station". Withdrawal of the rejection of claim 17, as indefinite, is therefore also respectfully requested.

Claims 1 and 6 were rejected, 35 USC 102(b), as anticipated by Bollinger et al patent 5,278,892 (hereinafter Bollinger), claim 12 was rejected, 35 USC 102(e), as being anticipated by Schneider patent 6,570,871, and claims 2-5, 7-11, and 13 to 17 were rejected, 35 USC 103(a), as unpatentable over Bollinger in view of Schneider. In response thereto, applicants are canceling claims 1-15, amending claim 17, amending claim 16 to now depend from amended claim 17, and adding new claims 18-21.

Applicants' invention is directed to solving problems with respect to soft handoff of a mobile from a serving base station to a target base station in an Internet Protocol (IP) wireless packet switched network. Bollinger, the primary reference relied upon by the Examiner, discloses soft handoff operation but for circuit switched networks, and the Bollinger disclosure does not teach or suggest the significant different procedures invented by applicants for the soft handoff in a packet-switched IP network.

Bollinger assumes that a "one call processing unit" is responsible for distributing copies of the same traffic to the serving and target service nodes; this is described at column 4, lines 1-23 of Bollinger. Bollinger also assumes that the traffic between a service node and the one call processing unit is transmitted over TDM lines; see Bollinger Fig.3, the TDM bus 140 and DSI Interface 242 which are both TDM links. In other words, Bollinger provides a soft handoff method for circuit switched networks, and, as such , the Bollinger disclosure and teaching are in the same category as the prior art described by applicants, e.g. at page 7, lines 7-20 of their specification and with reference to applicants' Fig. 1.

Applicants' invention, however, solves significantly different problems for handoff in a packet-switched IP network where IP packets, rather than TDM time slots, are used to transport user/call traffic. In such a system preferably there is no centralized entity such as the Bollinger "one call processing unit" for distributing packets to multiple service nodes because

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implementing such a centralized control unit is disadvantageous in an IP network and can be considerably more difficult than in a circuit-switched network.

With TDM networks, as disclosed and taught by Bollinger, synchronization can be easily supported by having a centralized entity such as Bollinger's one call processing unit distribute copies of the same user data in the same numbered TDM slots to both the first or serving node and the second or target node.

Packet switched networks (e.g., Ethernet) may not use TDM transport. In such IP packet switched networks, achieving content synchronization and frame synchronization, which are the two major requirements to support soft handoff, become much more difficult than, as discussed above, in circuit switched networks. Applicants' invention presents an inventive and non-obvious solution to solve this problem of synchronization. As pointed out at page 8, line 3 et seq of applicants' specification, in such a network there is no central control unit and the base stations or nodes function autonomously. "Because the base stations 100 functions autonomously and are interconnected via an all IP backbone network 107 prior art methods will not support soft handoff in the network of FIG. 1D." (Applicant's specification page, lines 12-14)

Bollinger does not provide or suggest any method for accomplishing data content and frame synchronization over packet switched networks and hence can not be used to support soft handoff over such networks, because Bollinger relies on the synchronization capability of TDM links for content and frame synchronization and these capabilities are no longer available in a packet switched network wherein the base stations operate autonomously.

Applicants appreciate that the term "remote layering" represents a new concept and the Examiner may not have fully appreciated what it means. "Remote layering" is defined in applicants' specification at page 9, lines 12-14. Because this is central to applicants' invention and the summary of the invention therein set forth at page 9, lines 9 through 25 states this most clearly applicants desire to repeat that summary, as amended, here for the Examiner's review:

> Broadly, our invention in one aspect is a method wherein network information processing is done remotely, distributed to other available resources that do not replicate the remote processing done at that layer, and then routed by such other resources to a final destination. We refer to this aspect of our invention as remote layering because layer processing for a first resource or node is done remotely at a second resource or node. In this way, a base station can function autonomously to support soft handoff without the need for a centralized unit to distribute traffic to multiple base stations and to select copies of traffic sent by a mobile via multiple base stations into the backbone network, thereby increasing network efficiency. In the context of a packet switched backbone network, such as an IP-based wireless network having autonomous base stations, remote layering allows a first base station to process information at a layer, assemble that information into a protocol data unit or packet corresponding to the layer, copy the assembled packet, and send a copy of the packet to a second base station. The second base station then relays the packet to a mobile unit without replicating the processing previously done at the first layer on the first base station. As such, an IP-based wireless network can support soft handoff without the need for any centralized control. Remote layering by obviating the need for central control, as is done in the prior art, increases network efficiency.

In Bollinger, call traffic is simply transported from one node to another inside frames of the link layer (i.e, TDM time slots) between nodes. The receiving node will extract/recover the call traffic from the link layer frames, re-do the link processing for call traffic for transmitting the call traffic over the wireless channel, and then transmit the traffic over a new wireless link layer subsequently (see column 4, line 42 to column 5, line 38). This is a standard way of transporting data over layered networks.

The remote layering concept of applicants' invention is completely different. Consider the case where copies of an IP packet need to be distributed to a mobile through both a serving based station and a target base station. In accordance with applicants' inventive remote layering approach, the serving base station serves as the anchor node to receive the IP packet from the core network and will be responsible for distributing it both to the mobile over its local radio channel as well as via the target base station. To do this the serving base station will first turn the IP packet into link layer frames of the link layer over its local radio channel to the mobile. To understand the difference between applicants' remote layering concept and Bollinger's disclosure and teaching, it is important to note that the link layer frames here are not the frames of the link layer between the serving base station and the target base station. The serving base station will then encapsulate these link layer frames inside IP packets and send the IP packets over the packet-switched IP network to the target base station. Upon receiving the encapsulated IP packets, the target base station will extract the link layer frames out of the encapsulated IP packets.

To further understand the difference between applicants' invention and Bollinger it is also important to note that the target base station does not extract out the original call traffic, i.e., the IP packet, as Bollinger will do (see column 5, lines 33-38) According to Bollinger, the second node or target base station will send only the call traffic received from the one call processing unit to the mobile, suggesting that the target base station or second node will not forward the link layer frame received from the one call processing unit as is to the mobile. However, with applicants' invention, the target base station will use the link layer frames received from the serving base station, *as if these link layer frames were generated by the target base station itself.* In other words, the target base station does not repeat link layer processing for this IP packet for transmission over its local radio channel to the mobile, but will instead use the result of the link layer processing done remotely on the serving base station (hence the term remote layering). In particular, the target base station will simply send the link layer frames received from the serving based station as is to the mobile.

Applicant therefore submits that Bollinger does not disclose, teach, or suggest any method for remote layering, as defined by applicants. Instead, as explained above, Bollinger simply applies standard data transport over a layered network. However, as also discussed above, such standard data transport over a packet switched network will not be able to support soft handoff in such a packet switched network.

The disclosure and teaching of Schneider do not overcome the complete deficiencies of Bollinger, as discussed above. Schneider does disclose, as the Examiner has pointed out, a packet assembler that packetizes digital voice samples into data packets and assigns a destination address to the data packet. But there is no suggestion or even hint in Schneider of a first serving base station processing packets to produce the remote layered packet in an encapsulated IP data packet, transmitting that IP encapsulated data packet to a second target base station, and then the target base station removing the encapsulated remote layer data packet and relaying it to the

mobile, without repeating the link layer processing that had been done remotely at the first serving base station to effectuate the soft handoff.

Applicant's new independent method claims 18 and 20 both recite that the serving and target base stations in the IP wireless network are autonomous without centralized control, thereby positing the problem for soft handoff in an IP wireless packet network, as discussed above, and then further precisely recite the method steps of applicants' invention which resolve those problems. Specifically, as recited in new claim 18, the serving base station processes the packets to produce the remote layered packet and encapsulates that in an IP encapsulated packet which is transmitted to the target base station, with the target base station removing the remote layered data packet from the encapsulated data packet and relaying it to the mobile. Claim 18 further recites that the remote layered packets produced at the serving station can be used by the target base station as if they were, in fact, processed there at the target base station, in accordance with applicants' concept of remote layered packets which obviates the need for processing at the target base station.

Claim 20 similarly distinguishes, with the claim further reciting the steps for soft handoff that the data packet is transmitted over air to the serving base station, that the encapsulated IP data packet including the remotely layered packet is sent from the serving base station to the target base station through a cross layer tunnel, and that the mobile combines the data packet from the serving base station and the remote layered at a packet removed from the IP encapsulated date packet and relayed from the target base station.

New claim 19 dependent on claim 18 adds that the step of transmitting the IP encapsulated remote layered data packet to the target base station is via an IP network and new dependent claim 21 adds to claim 20 that the combining step at the mobile involves comparing the data received from serving base station with the remote layered data received from the target base station.

System claim 17 has been amended similarly to recite the background problem that the base stations are autonomous and without a centralized network entity that distributes user traffic to both the serving base station and the target base station, and then recites the various system components including the means at the serving base station to produce the encapsulated internet protocol packet that include a copy of the data packet and the means at the target base station for relaying the encapsulated remote layered data packet to the mobile without repeating the processing done at the serving base station. Claim 16, now dependent from claim 17, adds that the encapsulated internet protocol packet includes a switching label and an internet protocol destination address corresponding to the target base station and the target base station includes means for removing the destination address and means responsive to the switching label for determining an outgoing channel to the mobile.

Reconsideration and allowance of claims 16 and 17, as amended and favorable consideration and allowance of new claims 18 to 21 are therefore respectfully requested.

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It is submitted that this application is now in condition to be passed to issue, and such action is also requested. However, if the Examiner deems it would in any way expedite the prosecution of this application, he is invited to telephone applicants' attorney at the number set forth below.

Respectfully submitted,

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By _____

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